

# REVISION OF THE FLATFISH GENUS *TRICHOPSETTA* (BOTHIDAE) WITH DESCRIPTIONS OF THREE NEW SPECIES<sup>1</sup>

WILLIAM W. ANDERSON AND ELMER J. GUTHERZ

*U. S. Fish and Wildlife Service, Bureau of Commercial Fisheries  
Biological Laboratory, Brunswick, Georgia*

## ABSTRACT

Three new species of flatfish, *Trichopsetta caribbaea*, *T. melasma*, and *T. orbisulcus*, are described. The only previously known species, *T. ventralis*, is redescribed. A terse description, relationship, range, illustration, and radiograph are provided for each species. Species of this genus are limited to the western North Atlantic from southern United States through the Caribbean to Surinam in depths of between 20 and 150 fathoms. A key is included for identifying species of this genus.

## INTRODUCTION

Three new species were included in materials of the flatfish genus *Trichopsetta* collected by the Bureau of Commercial Fisheries exploratory fishing vessels OREGON and SILVER BAY. Specimens were collected off the southeastern United States, off the Bahama Islands, in the Gulf of Mexico and Caribbean Sea, and off the northern coast of South America as far east as Surinam (Fig. 1). This paper redefines the genus, describes the three new species in comparison with the only previously known species, *Trichopsetta ventralis* (Goode and Bean), and provides a key to all four species. Species of this genus are limited to the western North Atlantic Ocean, from southern United States through the Caribbean Sea to Surinam in depths between about 20 and 150 fathoms.

## ABBREVIATIONS

The abbreviations used for the names of museums are as follows:

USNM	—	United States National Museum
MCZ	—	Museum of Comparative Zoology, Harvard
FMNH	—	Field Museum of Natural History, Chicago
SU	—	Stanford University Natural History Museum
ANSP	—	Academy of Natural Sciences of Philadelphia
LACM	—	Los Angeles County Museum of Natural History
BMNH	—	British Museum of Natural History, London
MNHM	—	Muséum National d'Histoire Naturelle, Paris
TABL	—	U. S. Bureau of Commercial Fisheries Tropical Atlantic Biological Laboratory, Miami.

---

<sup>1</sup> Contribution No. 73 from the U. S. Bureau of Commercial Fisheries Biological Laboratory, Brunswick, Georgia.

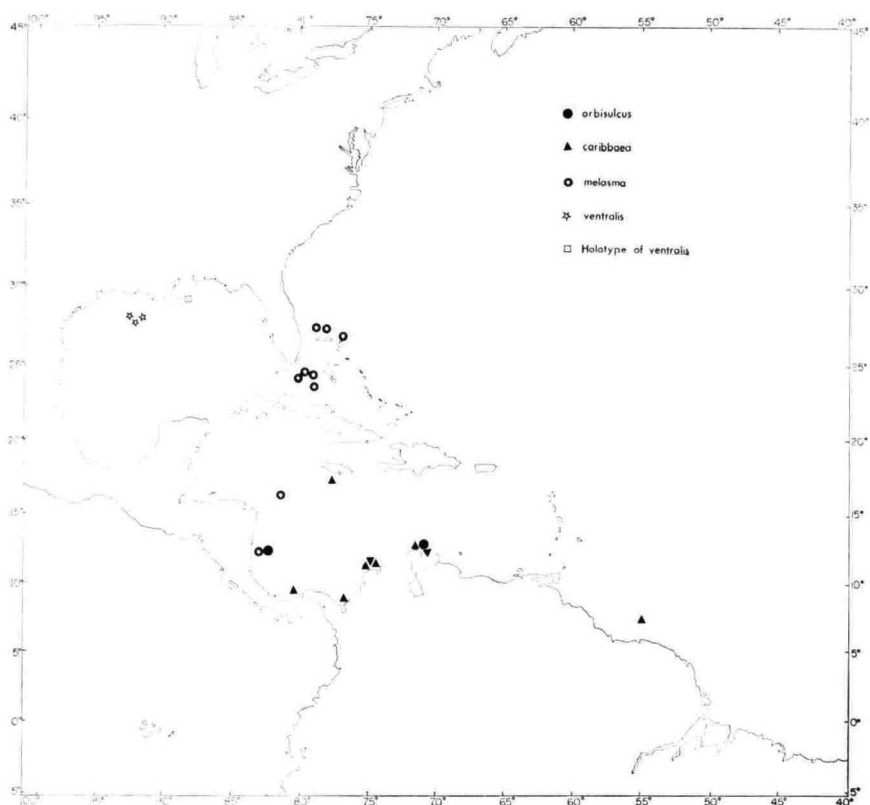


FIGURE 1. Locations of capture of study specimens of the four species of *Trichopsetta*, and locality for holotype of *T. ventralis* (Goode & Bean).

#### MEASUREMENTS AND COUNTS

Measurements were taken on the ocular side unless otherwise indicated. The terms used are defined below.

1. Standard length—Tip of snout to end of hypural plate, on blind side.
2. Head length—Tip of snout to posteriormost point of fleshy margin of opercle.
3. Body depth—Greatest vertical measurement, excluding fin rays.
4. Eye diameter (upper)—Horizontal distance across eye, not a measurement of the orbit.
5. Pectoral-fin length—From base of first (anteriormost) pectoral ray to tip of longest ray.
6. Pelvic-fin length—From base of first pelvic ray to tip of longest ray.
7. Upper-jaw length—Anterior edge of premaxillary to posterior edge of maxillary.
8. Dorsal- and anal-fin rays—Counts recorded as total number of rays.

9. Gill rakers—Counts recorded for lower limb of first arch, including rudiments (no gill rakers occur on the upper limb).
10. Scales in lateral line—Number in lateral line from above point of connection of opercular membrane with body to end of hypural plate.
11. Vertebrae—Counts recorded as abdominal and caudal (the first caudal vertebra has its enlarged hemal spine in contact with the first pterygiophore of the anal fin).

### *Trichopsetta*

*Trichopsetta* Gill, 1889: 601 (type-species *Citharichthys ventralis*, Goode & Bean, 1885, by monotypy).—Jordan & Evermann, 1898: 2669 (description).—Norman, 1934: 160 (description).

Sinistral; body ovate and compressed, depth less than  $\frac{1}{2}$  of standard length. Eyes about equal, separated by a narrow ridge; median groove may be present anteriorly. Mouth moderate, maxillary not extending beyond middle of lower eye. Jaws and dentition about equally developed on both sides; teeth small, conical, uniserial, and enlarged in front; vomer without teeth. Posterior nostril on blind side small, without membranous valve, close to anterior nostril; olfactory laminae few, arranged nearly parallel to each other, no central rachis. Gill rakers short and broad to moderately long and slender, not numerous; gill rakers absent on upper limb. Dorsal fin commencing behind and above posterior nostril of blind side, well in advance of upper eye; all rays simple. Pectoral fins unequal. Pelvic fins short based, that of the ocular side on median line and slightly in advance of that on blind side, six fin rays on each side. Caudal fin with 17 fin rays. Scales small, ctenoid on ocular side, cycloid on blind side. Ocular side of body scaled except for pectoral fin and its base, snout, interorbital, upper and lower jaws, and inter-radial membranes of fins; naked and scaled areas on blind side similar in extent to those on ocular side.

The general color pattern for preserved specimens is similar in all species. For this reason a statement of the color pattern is given here and is not repeated under the species discussions. Variations or color peculiar to a species are discussed under the species account. The color pattern consists of a brown or a tan (straw-colored) background with few to numerous spots or blotches on the body, median fins, and pelvic fin on ocular side. The background color and the number and intensity of spots or blotches vary greatly within and between species. Some color characteristics are common to all species: a dark spot on the body above the anterior edge of the cleithrum just anterior to the pectoral base; a small dark spot at the anterior end of the lateral line just above the point of connection of the opercular membrane. Most specimens of all species have: a series of spots on the body just under the dorsal fin and above the anal fin; a large blotch at the junction of the curved and straight

portions of the lateral line and another on the lateral line just anterior to the caudal peduncle.

#### KEY TO THE SPECIES OF *Trichopsetta*

- A. Gill rakers short and stout, 7 or 8 (including a rudiment) on lower limb of first arch; two furrows on head, one from anterior nostril on blind side to anterodorsal edge of upper orbit, the second just above anterior  $\frac{1}{3}$  of upper orbit; pectoral-fin length on blind side about 50 per cent that on ocular side ..... *Trichopsetta orbisulcus*
- AA. Gill rakers moderately long and slender, 9-11 (including rudiments) on lower limb of first arch; no furrows on head; pectoral-fin length on blind side either greater than on ocular side or exceeding 70 per cent the length on the ocular side.
  - B. Total scales in lateral line 84-94; pectoral fin on ocular side longer than on blind side; blind side dusky .... *Trichopsetta melasma*
  - BB. Total scales in lateral line 63-79; pectoral fin on blind side longer than on ocular side; blind side immaculate.
    - C. Total scales in lateral line 63-68; dorsal-fin rays 89-95; anal-fin rays 69-75 ..... *Trichopsetta ventralis*
    - CC. Total scales in lateral line 69-79; dorsal-fin rays 95-103; anal-fin rays 75-82 ..... *Trichopsetta caribbaea*

#### *Trichopsetta ventralis* (Goode & Bean)

Figs. 2, 3

*Citharichthys ventralis* Goode & Bean, 1885: 592 (type description; locality ALBATROSS 2386, Gulf of Mexico off Mississippi delta, 29°15'N, 88°06'W, 60 fathoms).

*Arnoglossus* (?) *ventralis*, Jordan & Goss, 1889: 262 (distribution and taxonomic placement).

*Trichopsetta ventralis*, Gill, 1889: 601-602 (description).—Goode & Bean, 1896: 440 (description).—Jordan & Evermann, 1898: 2667 (description).—Norman, 1934: 160 (description).

*Holotype*.—USNM 37343: ALBATROSS station 2386, Gulf of Mexico off Mississippi Delta, 29°15'N, 88°06'W, 60 fathoms.

*TABL Collections*.—OREGON station 3795, 28°05.5'N, 92°38'W, 45-50 fathoms, 14 September, 1962 (5 males, 112 to 140 mm S.L.; 5 females, 77 to 110 mm S.L.); OREGON station 4727, 27°54'N, 92°04.5'W, 100 fathoms, 26 February, 1964 (2 males, 118 and 133 mm S.L.); OREGON station 4750, 27°55'N, 91°43'W, 100 fathoms, 6 March, 1964 (4 males, 126 to 142 mm S.L.); no data (one male, 124 mm S.L.; one female, 122 mm S.L.).

*Diagnosis*.—*Trichopsetta ventralis* can be distinguished from all other known species of the genus by the low number of scales in the lateral line.

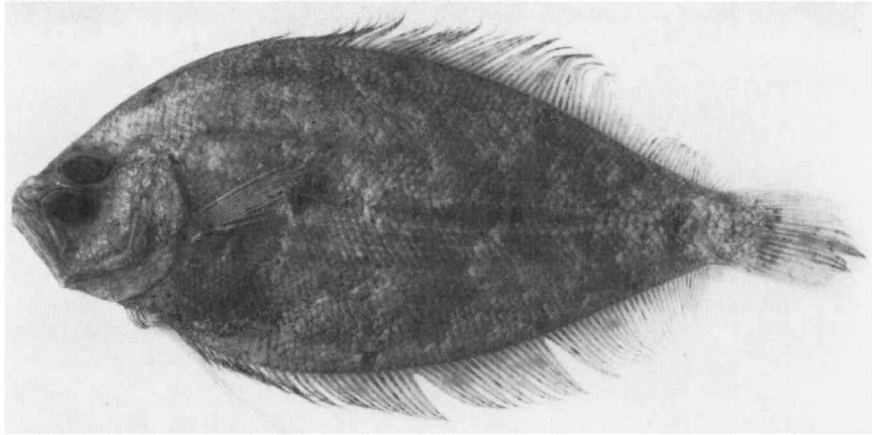


FIGURE 2. *Trichopsetta ventralis* (Goode & Bean), male, 140 mm S.L., OREGON station 4950.

It is also distinct from *T. orbisulcus* by the characters exclusive to that species (see section below, for diagnostic features of *T. orbisulcus*), and from *T. melasma* and most specimens of *T. caribbaea* by the lower number of dorsal- and anal-fin rays.

*Description.*—Counts and measurements of the study material for this species are given in Table 1, selected comparative counts for the four species in Table 2, and the range of selected body measurements (as per cent of standard length) for the four species in Table 3. A radiograph of a large specimen is shown in Figure 3.

The body is ovate, with the greatest depth about 42 to 49 per cent of the standard length. The head is deeply notched before the upper eye. The snout is blunt; the mouth is moderate, with the maxillary reaching a vertical through approximately the middle of the pupil of the lower eye. The upper jaw is about 40 to 42 per cent of the head length. The males lack well-developed spines on the head. The males have greatly elongated pelvic-fin rays on the blind side.

*Color.*—The basic color pattern is as given in the generic description. *T. ventralis* has a brown background with limited speckling and spots on the body and fins. The blotches at the junction of the straight and curved portions of the lateral line and near the base of the caudal fin are weak or missing in some specimens. Most males have a dark blotch on the anal fin between about the 4th and the 8th or 10th anal ray; this spot is weak or absent in some specimens. The blind side is immaculate.

TABLE 1  
SELECTED PROPORTIONAL MEASUREMENTS AND COUNTS OF *Trichopsetta ventralis*

	OREGON station number														No data
	3795	3795	4727	No data	4750	4750	4727	3795	3795	4750	4750	3795	3795	3795	
	♂	♀	♂	♂	♂	♂	♂	♂	♂	♂	♂	♀	♀	♀	♀
Standard length (mm)	112	118	118	124	126	132	133	136	138	140	140	142	77	89	96
Head length (mm)	29.2	32.6	32.0	33.4	34.2	36.8	36.5	37.0	39.0	37.6	36.0	38.2	21.6	26.1	26.8
Body depth (mm)	49.5	52.2	51.3	60.2	55.3	57.7	56.1	65.0	66.0	63.7	63.7	68.3	32.5	37.4	40.0
Measurements (as per cent of standard length)															
Head length	26.1	27.6	27.1	26.9	27.1	27.9	27.4	27.2	28.3	26.9	25.7	26.9	28.1	29.3	27.9
Body depth	44.2	44.2	43.5	48.5	43.9	43.7	42.2	47.8	47.8	45.5	45.5	48.1	42.2	42.0	41.7
Eye diameter (upper)	6.7	6.9	6.7	6.7	6.7	7.3	6.6	6.6	6.5	6.8	6.1	5.7	6.9	7.3	6.9
Pectoral fin blind side	29.8	27.4	27.3	21.7	26.7	26.7	24.1	26.8	28.6	31.0	31.1	22.5	-	23.3	19.2
Ocular side	18.8	18.1	17.4	18.6	18.4	-	17.4	19.3	20.4	18.6	18.0	17.6	18.7	18.5	17.3
Pelvic fin blind side	31.5	33.5	27.5	32.8	31.8	31.9	31.0	31.6	35.7	34.9	35.7	33.1	14.0	11.5	12.3
Ocular side	12.4	11.9	11.8	12.5	11.5	10.6	11.7	12.4	14.2	12.6	11.8	11.5	10.8	12.6	11.1
Counts															
Scales in lateral line	66	68	64	67	67	65	63	64	65	66	68	67	64	67	67
Dorsal-fin rays	94	93	92	93	89	90	91	90	92	94	93	89	89	90	93
Anal-fin rays	75	72	74	73	71	71	73	69	72	73	75	72	70	70	71
Gill rakers lower limb	10	11	11	10	11	10	9	10	11	9	10	10	9	10	10
Pectoral-fin rays blind side	10	8	8	8	7	7	8	7	9	9	8	8	-	8	7
Ocular side	13	12	12	12	12	12	13	12	13	12	12	12	12	12	12

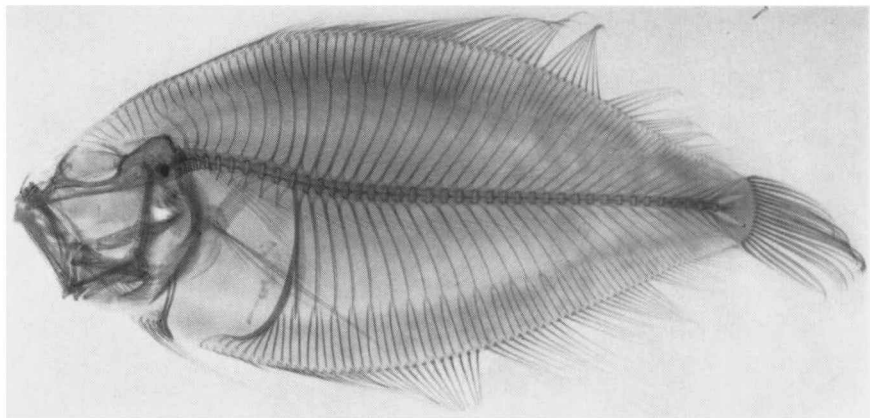


FIGURE 3. *Trichopsetta ventralis* (Goode & Bean), radiograph of male, 140 mm S.L., OREGON station 4950.

*Relationships.*—*Trichopsetta ventralis* is closest to *T. caribbaea* in the number of scales in the lateral line, but closest to *T. orbisulcus* in the numbers of dorsal- and anal-fin rays and vertebrae. *T. ventralis* and *T. caribbaea* are both immaculate on the blind side and the pectoral fin of the blind side is always the longer.

*Range.*—All specimens are from the northern Gulf of Mexico, near the type locality (ALBATROSS station 2386, 29°15'N, 88°06'W, in 60 fathoms). Hildebrand (1954), in a survey of the fauna of the brown shrimp grounds in the western Gulf of Mexico, recorded *Trichopsetta ventralis* from the shrimp grounds of south Texas and from the 24-10 grounds along the northern coast of Mexico. The 24-10 grounds extend, according to Hildebrand (1954: 245) "from about 20 miles below the Rio Grande to north-east of Sugarloaf Mountain at approximately 23°15'N." Hildebrand commented, "This distinctive flatfish was found only along the seaward edge of the present brown shrimp fishery. There may be a small shoreward movement during the spring, as it was taken in 18-24 fathoms during April and June and it was not taken during December and January in approximately the same locality." The species was not taken in trawl hauls made in 14-20 fathoms in the southern Gulf of Mexico off Álvaro Obregón in the Gulf of Campeche.

#### ***Trichopsetta caribbaea*, new species**

Figs. 4, 5

*Holotype.*—USNM 200414: OREGON station 3548, off south coast of Jamaica, 17°53'N, 77°56'W, 150 fathoms, 16 May, 1962 (male, 156 mm S.L.).

*Paratypes*.—USNM 200415: OREGON station 3548, off south coast of Jamaica, 17°53'N, 77°56'W, 150 fathoms, 16 May, 1962 (male, 147 mm S.L., collected with the holotype). USNM 200417: OREGON station 3587, off Panamá, 9°18'N, 80°25'W, 75 fathoms, 29 May, 1962 (one male, 104 mm S.L.; 5 females, 84 to 123 mm S.L.). USNM 200416: OREGON station 4843, off Colombia, 11°08.5'N, 74°29'W, 100-120 fathoms, 17 May, 1964 (2 males, 98 and 109 mm S.L.; 4 females, 96 to 116 mm S.L.). FMNH 66830: (one male, 86 mm S.L.; one female, 91 mm S.L.). MNHN 1966-737: (one male, 87 mm S.L.; one female, 100 mm S.L.). BMNH 1966.6.13.1-2: (one male, 93 mm S.L.; one female, 104 mm S.L.). MCZ 44911: (one male, 95 mm S.L.; one female, 122 mm S.L.). SU 63561: (one female, 80 mm S.L.). OREGON station 4844, off Colombia, 11°06.7'N, 74°30'W, 100 fathoms, 17 May, 1964. ANSP 103614: (one male, 93 mm S.L.; one female, 112 mm S.L.). LACM 6916-1: (one female, 117 mm S.L.). OREGON station 4856, off Colombia, 11°08'N, 74°23.8'W, 100 fathoms, 19 May, 1964. TABL Collection: OREGON station 4304, off Surinam, 7°30'N, 55°00'W, 100 fathoms, 24 March, 1963 (one male, 125 mm S.L.; 3 females, 131 to 150 mm S.L.); OREGON station 4391, off Colombia, 12°33'N, 71°09'W, 40 fathoms, 25 September, 1963 (one male, 130 mm S.L.; one female, 140 mm S.L.); OREGON station 4394, off Colombia, 12°37'N, 71°10'W, 65 fathoms, 25 September, 1963 (one female, 109 mm S.L.); OREGON station 4846, off Colombia, 11°06.8'N, 74°23.6'W, 50 fathoms, 17 May, 1964 (3 males, 90 to 111 mm S.L.; 3 females, 84 to 94 mm S.L.); OREGON station 4852, off Colombia, 11°07'N, 74°26'W, 60-65 fathoms, 18 May, 1964 (5 males, 86 to 99 mm S.L.; one female, 100 mm S.L.; 2 males or females, 74 and 81 mm S.L.); OREGON station 4857, off Colombia, 11°07'N, 74°21.5'W, 40-50 fathoms, 19 May, 1964 (3 males, 85 to 93 mm S.L.; 3 females, 87 to 110 mm S.L.; 1 male or female, 56 mm S.L.); OREGON station 4872, off Colombia, 11°01.8'N, 75°14'W, 35 fathoms, 23 May, 1964 (2 males, 98 and 134 mm S.L.; 4 females, 113 to 132 mm S.L.); OREGON station 4898, off Colombia, 08°53.8'N, 76°51.6'W, 100 fathoms, 27 May, 1964 (3 females, 73 to 96 mm S.L.).

*Diagnosis*.—*Trichopsetta caribbaea* is distinguished from the other members of the genus only by a combination of characters. It differs from *T. orbisulcus* (in addition to the characters exclusive to that species) in having more vertebrae and dorsal- and anal-fin rays, from *T. ventralis* in having more scales in the lateral line and (in most specimens) more dorsal- and anal-fin rays, and from *T. melasma* in having fewer scales in the lateral line and in having the longer pectoral fin on the blind side.

*Description*.—Counts and measurements of the holotype and 20 paratypes are given in Table 4, selected comparative counts for the four species in



TABLE 2  
SELECTED COMPARATIVE COUNTS FOR THE FOUR SPECIES OF *Trichopsetta*

	Total number of scales in lateral line																			
	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82
<i>T. ventralis</i>	3	3	2	3	5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>T. caribbaea</i>	-	-	-	-	-	-	1	5	10	11	10	14	3	2	2	1	2	-	-	-
<i>T. melasma</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	2
<i>T. orbisulcus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-
	Dorsal-fin rays										Vertebrae*									
	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	10-30	10-31	10-32	10-33
<i>T. ventralis</i>	4	3	1	2	5	2	1	-	-	-	-	-	-	-	-	-	9	9	-	-
<i>T. caribbaea</i>	-	-	-	-	-	-	2	12	9	13	15	7	2	1	2	-	-	3	15	3
<i>T. melasma</i>	-	-	-	-	-	-	-	-	-	2	2	2	2	3	3	2	-	2	12	1
<i>T. orbisulcus</i>	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
	Anal-fin rays										Gill rakers on lower limb of first arch									
	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	7	8	9	10
<i>T. ventralis</i>	2	2	3	3	4	2	2	-	-	-	-	-	-	-	-	-	-	-	3	11
<i>T. caribbaea</i>	-	-	-	-	-	-	3	8	15	13	11	8	3	2	-	-	-	-	10	41
<i>T. melasma</i>	-	-	-	-	-	-	-	-	-	-	-	3	2	2	4	1	-	-	6	6
<i>T. orbisulcus</i>	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-

\* Precaudal plus caudal vertebrae.

TABLE 3  
RANGE OF MEASUREMENTS (AS PER CENT OF STANDARD LENGTH) IN THE FOUR SPECIES OF *Trichopsetta*

	<i>ventralis</i>		<i>caribbaea</i>		<i>melasma</i>		<i>orbisulcus</i>	
	♂	♀	♂	♀	♂	♀	♂	♀
Head length	25.7-28.3	26.6-29.3	25.8-29.0	27.5-29.7	23.2-26.1	24.9-28.6	24.8	25.5
Body depth	42.2-48.5	41.7-47.9	39.8-44.9	38.4-43.4	39.7-43.0	39.9-42.9	42.4	42.8
Eye diameter (upper)	5.7- 7.3	6.1- 7.3	6.3- 8.2	7.0- 8.5	6.3- 7.8	6.9- 8.5	6.9	7.3
Pectoral fin								
blind side	21.7-31.1	19.2-25.8	19.4-23.8	16.7-24.5	10.6-13.9	10.7-14.3	6.9	6.8
ocular side	17.4-20.4	17.3-18.7	12.0-18.1	16.1-18.3	13.3-16.0	14.0-14.9	13.6	13.4
Pelvic fin								
blind side	27.5-35.7	11.5-14.0	25.9-36.9	10.6-13.4	31.3-59.7	10.6-12.9	10.6	11.1
ocular side	10.6-14.2	10.8-12.6	10.8-12.5	9.9-12.9	10.3-11.8	9.8-11.4	11.6	10.9

TABLE 4  
SELECTED PROPORTIONAL MEASUREMENTS AND COUNTS OF *Trichopsetta caribbaea* (HOLOTYPE AND FIRST 20 PARATYPES EXAMINED)

	OREGON station number										
	4872 ♂	3587 ♂	4304 ♂	4391 ♂	4872 ♂	3548 ♂	3548 ♂*	3587 ♀	3587 ♀	3587 ♀	4394 ♀
Standard length (mm)	98	104	125	130	134	147	156	84	91	98	109
Head length (mm)	26.9	29.0	36.3	35.8	38.6	40.1	40.3	23.8	25.6	28.2	30.8
Body depth (mm)	39.0	42.0	53.6	58.4	56.6	64.0	65.0	35.0	39.5	38.5	44.0
Measurements (as per cent of standard length)											
Head length	27.4	27.9	29.0	27.5	28.8	27.3	25.8	28.3	28.1	28.8	28.3
Body depth	39.8	40.4	42.9	44.9	42.2	43.5	41.7	41.7	43.4	39.3	40.4
Eye diameter (upper)	8.1	7.2	7.5	7.5	8.2	6.3	6.4	8.0	8.1	7.1	7.9
Pectoral fin: blind side	23.8	21.0	21.7	23.2	23.1	19.4	21.0	21.7	20.7	18.2	19.4
ocular side	15.9	16.5	12.0	16.5	18.1	16.7	16.3	17.7	16.5	16.1	16.5
Pelvic fin: blind side	25.9	26.7	31.0	31.4	36.2	36.9	35.6	11.4	11.2	10.6	11.0
ocular side	10.8	12.5	11.0	12.3	12.0	11.9	11.3	11.1	10.9	10.3	9.9
Counts											
Scales in lateral line	74	75	70	74	74	75	72	76	69	77	72
Dorsal-fin rays	102	98	97	97	98	99	98	99	97	100	100
Anal-fin rays	81	77	77	76	77	79	76	75	76	78	81
Gill rakers: lower limb	9	11	10	10	11	11	10	9	9	10	11
Pectoral-fin rays: blind side	7	8	7	8	8	7	8	8	8	7	8
ocular side	12	12	12	12	12	12	12	12	12	12	12

\* Holotype.

Table 2, and range of selected body measurements (as per cent of standard length) for the four species in Table 3. A radiograph of the holotype is shown in Figure 5.

The body is ovate, with its greatest depth about 38 to 45 per cent of the standard length. The head is deeply notched before the upper eye. The snout is blunt; the mouth is moderate, with the maxillary usually reaching a vertical through the middle of the pupil of the lower eye. The upper jaw is about 39-43 per cent of the head length. The males lack

TABLE 4 (CONTINUED)

	OREGON station number									
	4872 ♀	3587 ♀	3587 ♀	4872 ♀	4872 ♀	4304 ♀	4872 ♀	4304 ♀	4391 ♀	4304 ♀
Standard length (mm)	113	117	123	123	128	131	132	138	140	150
Head length (mm)	33.6	32.6	34.1	36.0	37.0	37.0	38.7	38.3	38.5	42.5
Body depth (mm)	46.2	50.5	50.7	47.2	52.2	51.6	55.3	56.0	57.5	60.1
Measurements (as per cent of standard length)										
Head length	29.7	27.9	27.7	29.3	28.9	28.2	29.3	27.8	27.5	28.3
Body depth	40.9	43.2	41.2	38.4	40.8	39.4	41.9	40.6	41.1	40.1
Eye diameter (upper)	8.5	7.4	7.6	7.3	7.8	7.0	7.6	7.2	7.6	7.3
Pectoral fin:										
blind side	22.9	21.4	24.5	16.7	—	20.9	21.8	22.9	—	21.0
ocular side	17.4	17.3	18.0	16.1	17.7	16.1	18.3	17.4	17.1	17.3
Pelvic fin:										
blind side	12.5	12.3	12.2	10.8	12.1	11.1	13.1	11.6	13.4	11.7
ocular side	12.3	12.1	12.0	10.4	11.3	10.3	11.7	11.2	12.9	11.1
Counts										
Scales in lateral line	72	74	71	73	70	73	73	73	72	71
Dorsal-fin rays	98	99	95	98	96	99	97	100	96	98
Anal-fin rays	77	79	77	80	76	79	76	78	77	76
Gill rakers:										
lower limb	10	11	11	9	10	11	10	10	10	10
Pectoral-fin rays:										
blind side	8	7	8	8	8	7	8	8	8	8
ocular side	12	12	12	13	12	11	13	12	13	12

well-developed spines on the head, and have greatly elongated pelvic-fin rays on the blind side.

*Color*.—The basic color pattern is as given in the generic description. *T. caribbaea* has a background color varying from tan to brown, with few to numerous spots and blotches on the body and fins in addition to the basic pattern. A few males have a dark blotch on the anterior rays of the anal fin. Usually a pair of faint spots is present on the caudal rays near the base of the fin. The blotches at the junction of the straight and curved portions of the lateral line and on the lateral line near the caudal peduncle are distinct on some specimens, but are diffuse or absent on others. The blind side is immaculate.

*Relationships*.—*Trichopsetta caribbaea* is closest to *T. orbisulcus* in number of scales in the lateral line, but nearer *T. melasma* in numbers of

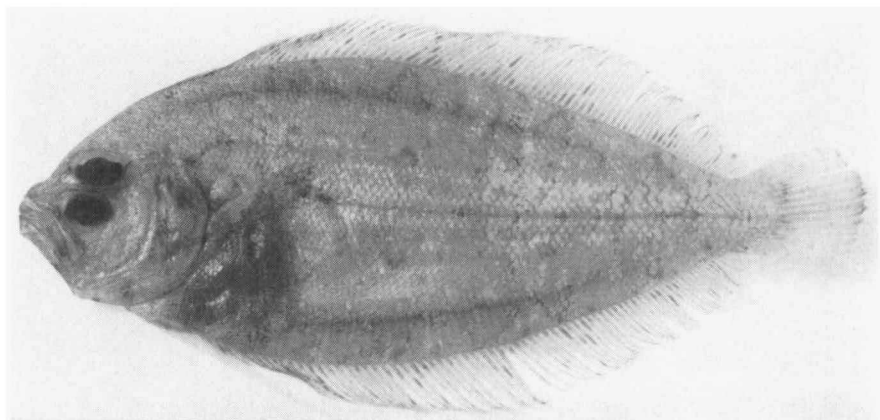


FIGURE 4. *Trichopsetta caribbaea*, holotype.

dorsal- and anal-fin rays. In the possession of a high number of vertebrae it agrees with *T. melasma*, as compared with the lower count in *T. orbisulcus* and *T. ventralis*. Both *T. caribbaea* and *T. ventralis* are immaculate on the blind side, and have the longer pectoral fin on the blind side.

*Range*.—In the Caribbean off Jamaica, Panamá, and Colombia in 35 to 150 fathoms; one catch from off Surinam in 100 fathoms.

*Name*.—This species is named *caribbaea* for the Caribbean Sea, where most of the specimens were collected.

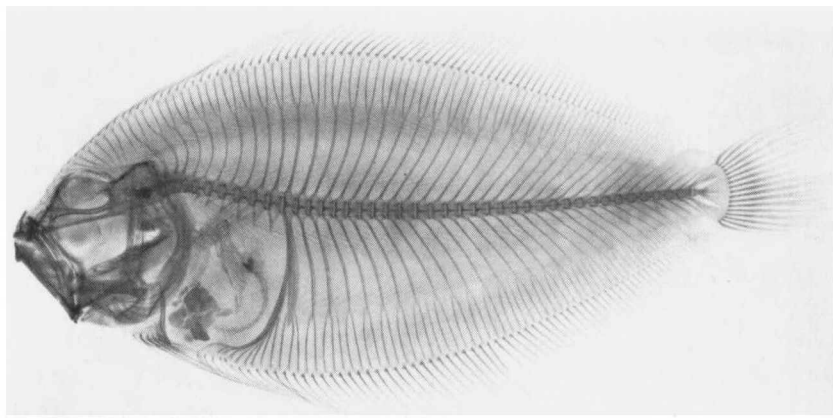


FIGURE 5. *Trichopsetta caribbaea*, radiograph of holotype.

TABLE 5  
SELECTED PROPORTIONAL MEASUREMENTS AND COUNTS OF *Trichopsetta melasma*

	OREGON OF SILVER BAY station number															
	S.B. 2445	S.B. 3467	S.B. 3469	S.B. 3608	S.B. 3608	S.B. 3608	Ore. 2470	Ore. 3625	S.B. 2467	S.B. 2471	S.B. 3469	S.B. 3577	S.B. 3467	S.B. 3476	Ore. 3625	Ore. 3625
	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♀	♀
Standard length (mm)	122	122.5	144.5	150	160.5	175	181	199	73	75.3	116.6	134	152	175	177	205
Head length (mm)	31.8	30.7	33.5	38.8	40.7	43.0	43.1	48.1	19.5	21.5	29.8	34.2	40.2	44.5	44.0	51.6
Body depth (mm)	52.0	48.8	59.2	59.6	65.8	74.5	77.8	83.0	30.2	30.5	50.0	53.5	65.2	71.4	76.0	82.0
Measurements (as per cent of standard length)																
Head length	26.1	25.1	23.2	25.9	25.4	24.6	23.8	24.2	26.7	28.6	25.6	25.5	26.4	25.4	24.9	25.2
Body length	42.6	39.8	41.0	39.7	41.0	42.6	43.0	41.7	41.4	40.5	42.9	39.9	42.9	40.8	42.9	40.0
Eye diameter (upper)	7.5	7.3	—	7.8	6.5	6.3	6.6	6.8	8.1	8.5	7.5	7.1	7.2	6.9	6.9	7.1
Pectoral fin																
blind side	13.9	10.6	—	11.5	13.1	12.2	11.8	10.6	13.2	14.3	11.0	11.9	11.1	12.0	11.2	10.7
ocular side	15.5	13.5	13.3	14.9	16.0	15.4	15.0	14.7	14.0	14.6	14.2	—	14.7	14.7	14.9	14.4
Pelvic fin																
blind side	34.7	31.3	34.7	59.7	42.6	53.4	47.6	52.5	11.0	12.9	10.6	11.2	11.4	—	11.9	10.8
ocular side	10.7	10.3	10.9	11.3	11.8	10.6	10.4	11.2	10.7	10.6	9.1	10.7	10.7	11.4	11.3	9.8
Counts																
Scales in lateral line	87	91	92	90	87	94	93	84	88	88	86	89	85	90	92	91
Dorsal-fin rays	99	101	100	103	103	100	102	102	98	101	99	102	98	103	104	104
Anal-fin rays	82	83	81	83	84	81	83	83	80	82	80	84	80	84	85	84
Gill rakers																
lower limb	9	11	11	11	9	11	10	9	9	10	10	10	9	10	9	10
Pectoral-fin rays																
blind side	9	8	10	8	9	9	9	7	9	8	10	8	9	9	8	9
ocular side	12	12	12	12	13	12	11	13	12	9	13	12	13	12	12	13

\* Holotype.

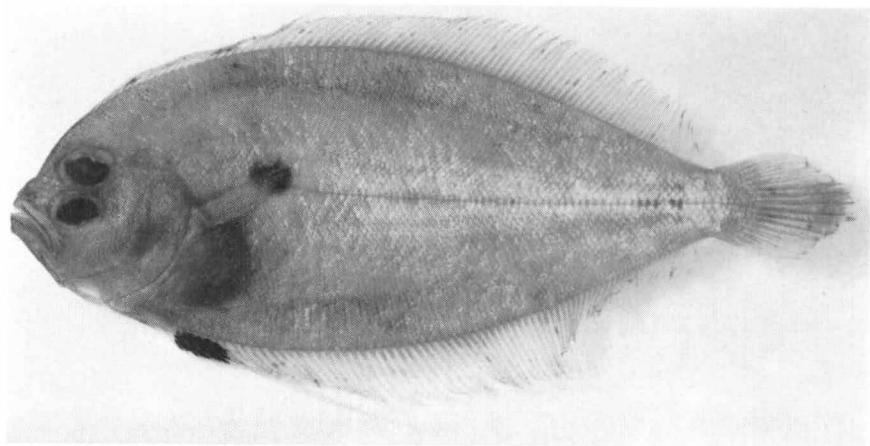


FIGURE 6. *Trichopsetta melasma*, holotype.

***Trichopsetta melasma*, new species**

Figs. 6, 7

*Holotype*.—USNM 200418: SILVER BAY station 2467, Great Bahamas Bank off Andros Island, 23°40'N, 79°06'W, 125 fathoms, 6 November, 1960 (male, 181 mm S.L.).

*Paratypes*.—USNM 200420: SILVER BAY station 2445, Straits of Florida off Cay Sal Bank, 24°08'N, 80°08'W, 138 fathoms, 3 November, 1960 (one male, 122 mm S.L.). USNM 200421: SILVER BAY station 3476, off Great Abaco Island, 26°49'N, 77°01'W, 75 to 150 fathoms, 26 October, 1961 (one female, 134 mm S.L.). USNM 200419: OREGON station 3625, off Honduras, 16°26'N, 81°35'W, 120 fathoms, 6 June, 1962 (one female, 177 mm S.L.). MCZ 44912: SILVER BAY station 2470, off Andros Island and southern tip of Florida, 24°25'N, 79°13'W, 125 fathoms, 7 November, 1960 (one male, 160 mm S.L.). BMNH 1966.6.13.3: SILVER BAY station 2471, off Andros Island and southern tip of Florida, 24°34'N, 79°16'W, 150 fathoms, 7 November, 1960 (one male, 199 mm S.L.). SU 63562: SILVER BAY station 2471, off Andros Island and southern tip of Florida, 24°34'N, 79°16'W, 150 fathoms, 7 November, 1960 (one female, 175 mm S.L.). TABL Collection: SILVER BAY station 3467, north of Grand Bahama Island, 27°27'N, 79°00'W, 125-150 fathoms, 25 October, 1961 (one male, 122 mm S.L.; one female, 116 mm S.L.); SILVER BAY station 3469, north of Grand Bahama Island, 27°23'N, 78°35'W, 110 fathoms, 25 October, 1961 (one male, 144 mm S.L.; one female, 73 mm S.L.); OREGON station 3577, off Nicaragua, 12°32'N, 82°25'W, 85 fathoms, 23 May, 1962 (one female, 75 mm S.L.); OREGON station 3625, off Honduras, 16°26'N,

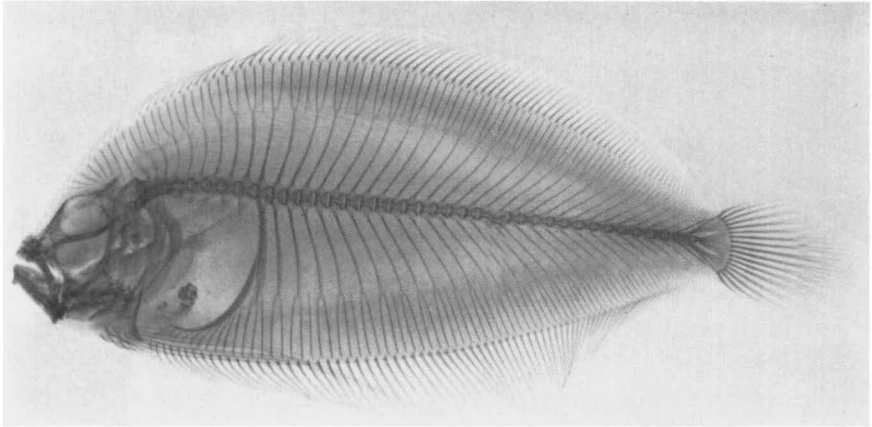


FIGURE 7. *Trichopsetta melasma*, radiograph of holotype.

81°35'W, 120 fathoms, 6 June, 1962 (one male, 175 mm S.L.; 2 females, 152 and 205 mm S.L.).

*Diagnosis.*—*Trichopsetta melasma* can be distinguished from the other species of the genus by the high number of scales in the lateral line. It is distinct also from *T. ventralis* and *T. orbisulcus* in having a higher number of dorsal- and anal-fin rays, and from *T. caribbaea* in having the longer pectoral fin on the ocular side.

*Description.*—The counts and measurements for the holotype and paratypes are given in Table 5, the selected comparative counts for the four species are in Table 2, and the ranges of selected body measurements (as per cent of standard length) for the four species are in Table 3. A radiograph of the holotype is shown in Figure 7.

The body is ovate, with its greatest depth about 39 to 43 per cent of the standard length. The head is deeply notched before the upper eye. The snout is blunt, the mouth moderate; the maxillary reaches a vertical through the anterior one-third to middle of the pupil of the lower eye. The upper jaw is about 37 to 41 per cent of the head length. The larger males have a well-developed symphyseal spine on the lower jaw, one on the snout above the upper lip, and on the anterior orbital rim of both eyes. The males have greatly elongated pelvic-fin rays on the blind side.

*Color.*—The basic color pattern is given in the generic description. *Trichopsetta melasma* tends to have a tan- or straw-colored background on the ocular side, and has fewer spots and blotches than do the other three species. The dark area at the junction of the straight and curved parts of the lateral line is more pronounced in *melasma* than it is in the other



species; it appears more as a round spot than as a blotch. The males have a black spot on the anterior portion of the anal fin, usually between the first and seventh rays. The blind side has a straw-colored background and is dusky.

*Relationships.*—*Trichopsetta melasma* is closest to *T. caribbaea* in number of vertebrae and dorsal- and anal-fin rays. Although there is an overlap in the numbers of both dorsal- and anal-fin rays, *T. melasma* averages a larger number of rays in both fins. *Trichopsetta melasma*, *T. ventralis*, and *T. caribbaea* are alike in the numbers of gill rakers on the lower limb of the first arch. Both *Trichopsetta melasma* and *T. orbisulcus* are dusky on the blind side; they have longer pectoral fins on the ocular side and well-developed head spines in the males.

*Range.*—Known from off south Florida and north of the Bahamas, Florida Straits between Andros Island and tip of Florida, Honduras, and Nicaragua in 75 to 150 fathoms (usually over 100 fathoms).

*Name.*—This species is given the name *melasma*, in reference to the black spot on the anterior rays of the anal fin in male specimens.

***Trichopsetta orbisulcus*, new species**

Figs. 8, 9

*Holotype.*—USNM 200422: OREGON station 4394, off western Venezuela, 12°37'N, 71°10'W, 65 fathoms, 25 September, 1963 (male, 116.6 mm S.L.).

*Paratype.*—TABL collection: OREGON station 3577, off Nicaragua, 12°32'N, 82°25'W, 85 fathoms, 23 May, 1962 (female, 97.3 mm S.L.).

*Diagnosis.*—*Trichopsetta orbisulcus* is distinguished from the other species of the genus in having: (1) two furrows on the head, one from the anterior nostril of the blind side to the anterodorsal edge of the upper orbit, and the second one just above the dorsal edge of the anterior  $\frac{1}{3}$  of the upper orbit; (2) the gill rakers short and stout, with 7 or 8 (including a rudiment) on the lower limb of the first arch; (3) the pectoral-fin length on the blind side about 50 per cent of that on the ocular side; and (4) the male without elongated pelvic-fin rays on the blind side.

*Description.*—The counts and measurements of the holotype and paratype are given in Table 6, the selected comparative counts for the four species are in Table 2, and the range of selected body measurements (as per cent of standard length) for the four species are in Table 3. A radiograph of the holotype is shown in Figure 9.

The body is ovate, with its greatest depth about 43 per cent of the standard length. The head is not deeply notched before the upper eye as in the other three species, but the profile is broken where the furrow

TABLE 6  
SELECTED PROPORTIONAL MEASUREMENTS AND COUNTS OF  
*Trichopsetta orbisulcus*

	OREGON station numbers	
	4394 ♂ *	3577 ♀
Standard length (mm)	116.6	97.3
Head length (mm)	28.9	24.8
Body depth (mm)	49.4	41.6
Measurements (as per cent of standard length)		
Head length	24.8	25.5
Body depth	42.4	42.8
Eye diameter (upper)	6.9	7.3
Pectoral fin		
blind side	6.9	6.8
ocular side	13.6	13.4
Pelvic fin		
blind side	10.6	11.1
ocular side	11.6	10.9
Counts		
Scales in lateral line	78	80
Dorsal-fin rays	91	92
Anal-fin rays	70	73
Gill rakers		
lower limb	8	7
Pectoral-fin rays		
blind side	10	10
ocular side	12	12

\* Holotype.

crosses from the upper eye on the ocular side to the anterior nostril on the blind side. The snout is blunt, the mouth moderate, with the maxillary reaching a vertical through the anterior edge of the pupil of the lower eye. The upper jaw is about 33 per cent of the head length. The male has a well-developed symphyseal spine on the lower jaw, one on the snout above the upper lip, and one on the anterior orbital rim of the lower eye.

*Color*.—The basic color pattern is given in the generic description. In *orbisulcus*, the furrows on the head are blackish, and the male has a large black spot on the dorsal fin between the 3rd and 7th rays. Markings on the ocular side of the pectoral fin form cross bars or bands on the distal part of the fin. The blind side is lightly dusky, more noticeably along the dorsal- and anal-fin bases on the posterior half of the body.

*Relationships*.—The genera *Trichopsetta* and *Engyophrys* are very closely

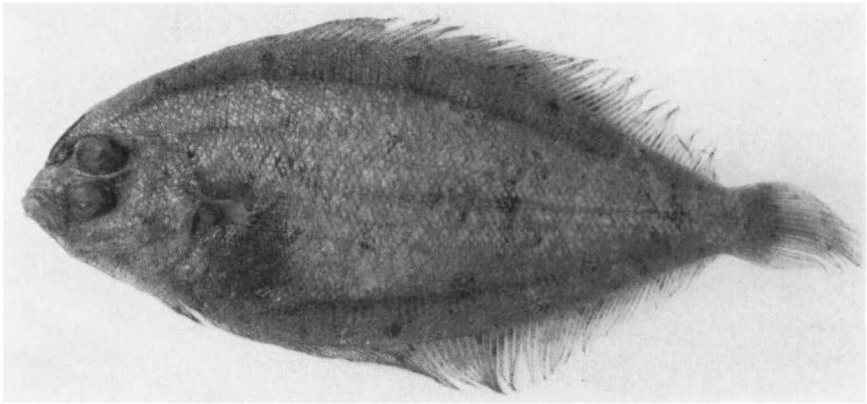


FIGURE 8. *Trichopsetta orbisulcus*, holotype.

related, and in some characters *T. orbisulcus* may be nearer to *Engyophrys* than to *Trichopsetta*. The males of the other three species of *Trichopsetta* all have some of the pelvic rays on the blind side greatly elongated, but *T. orbisulcus* and the known species of *Engyophrys* do not show this character. The shorter, heavier, and less numerous gill rakers on the lower limb of the first arch of *T. orbisulcus* approach the condition in *Engyophrys*, as opposed to the longer, more slender, and more numerous gill rakers in the other three species of *Trichopsetta*. However, the strong dentition in both blind and ocular sides of each of the two jaws, as well as the much larger mouth suggest a closer relationship to *Trichopsetta*; we place the species in this genus.

*T. orbisulcus* is closest to *T. ventralis* in numbers of vertebrae and dorsal- and anal-fin rays, but nearer to *T. caribbaea* in the total number of scales in the lateral line. The dusky color of the blind side and the presence in the males of a well-developed symphyseal spine on the lower jaw, on the snout above the upper lip, and on the orbital rim of one or both eyes, are shared only with *T. melasma*. Only in *T. orbisulcus* and *T. melasma* are the pectoral fins longer on the ocular side; in *orbisulcus* the pectorals of the blind side are only 50 per cent the length on the ocular side, whereas in *melasma* they are 70 per cent or more.

*Range*.—Known from only two specimens, one taken off Nicaragua in 85 fathoms, and the other off western Venezuela in 65 fathoms.

*Name*.—The name *orbisulcus* refers to the furrows on the head, above, and in front of, the upper eye (orbis = the orbit, and sulcus = a furrow).

#### ACKNOWLEDGMENTS

We thank Dr. James C. Tyler, of The Academy of Natural Sciences of

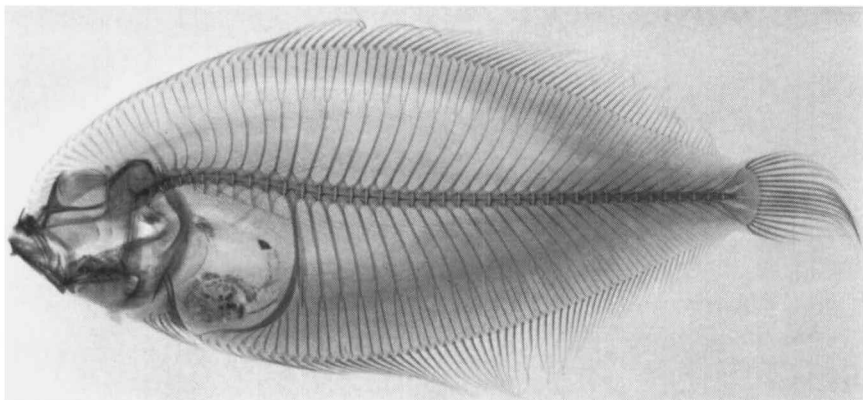


FIGURE 9. *Trichopsetta orbisulcus*, radiograph of holotype.

Philadelphia, for his thorough review of the manuscript. For their helpful suggestions on the manuscript we thank also: Dr. C. Richard Robins, Institute of Marine Sciences, University of Miami; and Frederick H. Berry and George C. Miller, U. S. Bureau of Commercial Fisheries Tropical Atlantic Biological Laboratory, Miami, Florida. We are indebted to Harvey R. Bullis, Jr., U. S. Bureau of Commercial Fisheries, Pascagoula, Mississippi, for the collection of specimens used in this study.

#### SUMMARY

The flatfish genus *Trichopsetta* has been redescribed and three new species added. Species of this genus are limited to the western North Atlantic Ocean, from the southern United States through the Caribbean to Surinam, in depths of 20 to 150 fathoms.

Descriptions, ranges, illustrations, and radiographs are given for the three new species and for the single previously known *Trichopsetta ventralis*. A key is included for identification of the four species.

*T. orbisulcus* can be distinguished from the other three species of *Trichopsetta* by the following characters: two furrows on the head, one anterior to the upper eye and the second above the upper eye; gill rakers, short and stout, 7-8; pectoral fin length on the blind side only about 50 per cent that of the ocular side. *T. melasma* can be separated from *T. ventralis* and *T. caribbaea* by the higher scale count of 84-94 (vs. 63-79), and by its possession of a longer pectoral fin on the ocular side than on the blind side. *T. ventralis* can be separated from *T. caribbaea* by the number of scales in the lateral line (63-68 vs. 69-79), the number of dorsal fin rays (89-95 vs. 95-103), and the number of anal fin rays (69-75 vs. 75-82).

## SUMARIO

REVISION DEL GENERO DE PECES PLANOS *Trichopsetta* (BOTHIDAE),  
CON DESCRIPCIONES DE TRES NUEVAS ESPECIES

Se redescrive el género de peces planos *Trichopsetta* y se añaden tres nuevas especies. Las especies de este género están limitadas a la región occidental del Atlántico Norte, del sur de los Estados Unidos, a través del Caribe, hasta Surinam y a profundidades de 20 a 150 brazas.

Se dan descripciones, variaciones, ilustraciones y radiografías de las tres nuevas especies así como de la única especie que era previamente conocida, *Trichopsetta ventralis*. Se incluye una clave para la identificación de las cuatro especies.

*T. orbisulcus* puede ser distinguida de las otras tres especies de *Trichopsetta* por los siguientes caracteres: dos surcos en la cabeza, uno anterior al ojo superior y el segundo arriba de dicho ojo; 7-8 rastrillos branquiales cortos y gruesos; el largo de la aleta pectoral en el lado ciego alrededor de un 50 por ciento del de la del lado con ojos. *T. melasma* puede ser separada de *T. ventralis* y *T. caribbaea* por el mayor número de escamas (84-94 contra 63-79), y por la posesión de aletas pectorales más largas en el lado ocular que en el lado ciego. *T. ventralis* puede ser separada de *T. caribbaea* por el número de escamas en la línea lateral (63-68 contra 69-79), el número de radios de la aleta dorsal (89-95 contra 95-103), y el número de radios de la aleta anal (69-75 contra 75-82).

## LITERATURE CITED

## GILL, THEODORE

1889. Gleanings among the pleuronectids, and observations on the name *Pleuronectes*. Proc. U. S. Nat. Mus., 11 (for 1888): 593-606.

## GOODE, G. BROWN AND TARLETON H. BEAN

1885. Descriptions of new fishes obtained by the United States Fish Commission mainly from deep waters off the Atlantic and Gulf Coast. Proc. U. S. Nat. Mus., 8: 589-605.

1896. Oceanic Ichthyology, a treatise on the deep-sea and pelagic fishes of the world, based chiefly upon the collections made by the Steamers BLAKE, ALBATROSS, and FISH HAWK in the northwestern Atlantic, with an atlas containing 417 figs. U. S. Nat. Mus., Spec. Bull. No. 2. xxxv + 553 pp.—Atlas. xxiii + 26 pls., 123 pls., 417 figs.

## HILDEBRAND, HENRY H.

1954. A study of the fauna of the brown shrimp (*Penaeus aztecus* Ives) grounds in the western Gulf of Mexico. Publs. Inst. Mar. Sci., 3 (2): 233-366.

## JORDAN, DAVID S. AND DAVID K. GOSS

1889. A review of the flounders and soles (Pleuronectidae) of America and Europe. U. S. Comm. of Fish & Fisheries. Part 14, Rept. of the Comm., for 1886: 225-342, 9 pls.

## JORDAN, DAVID S. AND BARTON W. EVERMANN

1898. The fishes of North and Middle America. Bull. U. S. Nat. Mus. 47 (3): xxiv + pp. 2183-3136.

1967] *Anderson & Gutherz: Revision of Flatfish Genus Trichopsetta* 913

NORMAN, JOHN R.

1934. A systematic monograph of the flat fishes (Heterosomata). Vol. 1, Psettodidae, Bothidae, Pleuronectidae. Brit. Mus. (Nat. Hist.), London. viii + 459 pp., 317 figs.